

1 1. A modular fire detection and extinguishing system, comprising:

2 a detector for detecting a fire within a fire hazard zone;

3 a trigger electrically coupled to the detector to generate an initiation signal

4 once the detector detects a fire in the fire hazard zone;

5 a gas generant fire extinguisher electrically coupled to the trigger to

6 receive the initiation signal;

7 a modular distribution line having one end in fluid communication with

8 the fire extinguisher and the other end connected to a nozzle for

9 dispersing fire suppressant within the fire hazard zone.

10 2. The system of claim 1, wherein the gas generant fire extinguisher

11 comprises:

12 a housing having gas generant stored in one end;

13 an initiator in communication with the gas generant; and

14 an orifice plate within the housing that separates the gas generant from fire

15 suppressant also stored within the housing, the orifice plate having

16 an exhaust gas orifice formed therein.

17 3. The system of claim 2, wherein the gas generant fire extinguisher is

18 configured such that gravity maintains substantially constant contact between the fire

19 suppressant and the exhaust gas orifice of the orifice plate.

1 4. The system of claim 2, wherein the exhaust gas orifice allows exhaust gas
2 generated by actuation of the gas generant to pass through the orifice plate and suspend
3 fire suppressant within the exhaust gas.

4 5. The system of claim 1, further comprising a manifold in fluid
5 communication with the gas generant fire extinguisher to allow a flow of exhaust gas
6 exiting the extinguisher to enter one or more distribution lines to disperse fire suppressant
7 throughout the fire hazard zone.

8 6. The system of claim 1, wherein the trigger comprises a first power source,
9 a switch coupled to the power source and the detector, the switch allowing an initiation
10 signal to flow from the power source to the gas generant fire extinguisher when the
11 detector detects a fire.

12 7. The system of claim 6, further comprising a second power source
13 positioned proximal to the switch.

14 8. The system of claim 7, wherein the first power source is coupled to the
15 second power source such that the second power source remains operable when the first
16 power source fails.

17 9. The system of claim 8, wherein the first power source comprises a battery
18 and the second power source comprises a capacitor.

19 10. The system of claim 1, wherein the detector is a linear temperature
20 sensitive cable.

1 11. The system of claim 1, wherein the fire suppressant is a dry powdered
2 suppressant.

3 12. The system of claim 1, wherein the fire suppressant is a liquid suppressant.

4 13. A modular engine compartment fire detection and extinguishing system
5 for vehicles, comprising:
6 a detector for detecting a fire within an engine compartment of a vehicle;
7 a trigger electrically coupled to the detector to generate an initiation signal
8 once the detector detects a fire in the engine compartment;
9 a gas generant fire extinguisher electrically coupled to the trigger to
10 receive the initiation signal;
11 a modular distribution line having one end in fluid communication with
12 the fire extinguisher and the other end connected to a nozzle for
13 dispersing fire suppressant within the engine compartment.

14 14. The system of claim 13, wherein the gas generant fire extinguisher
15 comprises:
16 a housing having gas generant stored in one end;
17 an initiator in communication with the gas generant;
18 an orifice plate within the housing that separates the gas generant from fire
19 suppressant also stored within the housing, the orifice plate having
20 an exhaust gas orifice formed therein.

1 15. The system of claim 14, wherein the gas generant fire extinguisher is
2 configured such that gravity acts to maintain substantially constant contact between the
3 fire suppressant and the exhaust gas orifice of the orifice plate.

4 16. The system of claim 15, wherein the exhaust gas orifice allows exhaust
5 gas generated by actuation of the gas generant to pass through the orifice plate and
6 suspend fire suppressant within the exhaust gas.

7 17. The system of claim 13, further comprising a manifold in fluid
8 communication with the gas generant fire extinguisher to allow a flow of exhaust gas
9 exiting the extinguisher to enter one or more distribution lines to disperse fire suppressant
10 throughout the engine compartment.

11 18. The system of claim 13, wherein the trigger comprises a first power
12 source, a switch coupled to the power source and the detector, the switch allowing an
13 initiation signal to flow from the power source to the gas generant fire extinguisher when
14 the detector detects a fire.

15 19. The system of claim 18, further comprising a second power source
16 positioned proximal to the switch.

17 20. The system of claim 19, wherein the first power source is coupled to the
18 second power source such that the second power source remains operable when the first
19 power source fails.

1 21. The system of claim 20, wherein the first power source comprises a
2 battery and the second power source comprises a capacitor.

3 22. The system of claim 21, wherein the modular distribution line comprises a
4 fastener on each end, such that the fasteners allow modular distribution lines to be
5 removably connected to the manifold, a nozzle, and each other by way of a coupler.

6 23. The system of claim 22, wherein the detector is a linear temperature
7 sensitive cable.

8 24. The system of claim 23, wherein the fire suppressant is a dry powdered
9 suppressant.

10 25. The system of claim 23, wherein the fire suppressant is a liquid
11 suppressant.

12 26. The system of claim 24, wherein the exhaust gas coats an engine within
13 the engine compartment with the fire suppressant.

14 27. The system of claim 26, wherein the system operates independently of
15 other vehicle systems.

16 28. A modular engine compartment fire detection and extinguishing system
17 for vehicles, comprising:

18 a detector for detecting a fire within an engine compartment of a vehicle;
19 a controller electrically coupled to the detector, the controller generating a
20 trigger signal when one or more pre-conditions are satisfied;

1 a trigger electrically coupled to the controller to generate an initiation
2 signal once a trigger signal is received from the controller;
3 a gas generant fire extinguisher electrically coupled to the controller to
4 receive the initiation signal;
5 a modular distribution line having one end in fluid communication with
6 the fire extinguisher and the other end connected to a nozzle for
7 dispersing fire suppressant within the engine compartment.

8 29. The system of claim 28, further comprising a shut-down module to stop
9 the engine based on a stop signal received from the controller such that a stop signal is
10 sent to the shut-down module when one or more pre-conditions are satisfied.

11 30. The system of claim 29, further comprising a notification module coupled
12 to the controller to notify a driver that an engine fire has been detected.

13 31. The system of claim 30, wherein the controller sends a message to the
14 driver of the vehicle requesting that the vehicle be stopped.

15 32. The system of claim 28, wherein the pre-condition comprises expiration of
16 a pre-determined time interval.

17 33. The system of claim 28, wherein the pre-condition comprises the velocity
18 of the vehicle being below a pre-determined level.

19 34. The system of claim 28, wherein the pre-condition comprises the engine
20 being shut down.

1 35. The system of claim 28, wherein the controller comprises a vehicle control
2 system.